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RESEARCH › RESEARCH SUMMARIES

Sharing our progress toward recovery

Research Summaries

Discover what the latest science from the RECOVER Initiative means for our ability to understand, diagnose, prevent, and treat **Long COVID**.

This page contains descriptions of findings from **RECOVER research studies**. These descriptions use plain language and a format that is easy to understand.

If you want to learn more about the scientific discoveries described here, you can also browse and search the complete list of **RECOVER Publications**.

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● OBSERVATIONAL ■ PREGNANT ADULT ◆ RISK FACTORS

Post-acute sequelae of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) after infection

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The RECOVER Initiative did a study to see how often pregnant women get Long COVID. The study looked at 1,502 pregnant participants. Participants took surveys about Long COVID symptoms around 10 months after they first got COVID. About 9% of them reported having Long COVID symptoms. The most common symptoms participants had were feeling very tired, especially after physical or mental activity, or being tired all the time. Some participants had stomach and gut problems. RECOVER researchers also found that people were more likely to get Long COVID if they needed extra oxygen while sick with COVID; had trouble paying bills; or had other health problems before COVID, such as obesity, depression, or anxiety. Future research will focus on whether having COVID while pregnant changes the chance of developing Long COVID. Researchers will compare this to people who got COVID when they were not pregnant.

English Video Summary (YouTube)

Spanish Video Summary (YouTube)

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● OBSERVATIONAL ■ PEDIATRIC ◆ BROAD SYMPTOMS
◆ RISK FACTORS

Characterizing Long COVID in children and adolescents

Gross, RS; Thaweethai, T; Kleinman, LC; et al., *JAMA*

This RECOVER study is one of the first of its kind to look at Long COVID symptoms in children across age groups. Researchers for this study also developed a new research tool to help identify children who were most

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between those with and without a history of a COVID infection. The symptoms that were most likely to identify school-age children with Long COVID were trouble with memory or focusing, back or neck pain, stomach pain, headache, fears, refusing to go to school, skin rashes, trouble sleeping, nausea or vomiting, and lightheadedness or dizziness. The symptoms that were most likely to identify teenagers with Long COVID included change or loss of smell or taste, bone, muscle or joint pain, back or neck pain, feeling tired all day or after walking, having low energy, trouble with memory or focusing, headache, and lightheadedness or dizziness. These study findings show Long COVID symptoms can affect almost every organ system in the body. It also showed that while many of the symptoms between the two age groups were similar, there were differences. Understanding why these differences occur can help create future Long COVID treatments for children that are age-group specific.

Read the Research Q&A →

Video Summary (YouTube)

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● EHR ■ PEDIATRIC

Pediatric nirmatrelvir/ritonavir prescribing patterns during the COVID-19 pandemic

Bose-Brill, S; Hirabayashi, K; Schwimmer, E; et al., *Hospital Pediatrics*

This RECOVER study looks at a medicine called nirmatrelvir/ritonavir, which is used to treat COVID-19 in teens and adults who are more likely to be hospitalized from the infection. Researchers wanted to understand why doctors might give this medicine to teens ages 12 to 17. They reviewed electronic health records (EHRs) from January 2022 to August 2023 to find which teens got this medicine after testing positive for

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medicine. Those with comorbidities (more than 1 ongoing health problem) were more likely to receive it. But most teens with 1 or more health problems did not receive this medication. This could be a reason why many teens with COVID-19 need to be hospitalized. The study also found that Hispanic or Latino kids were less likely to get the medicine compared to non-Hispanic, white kids. This study shows that kids with chronic health issues are more likely to get nirmatrelvir/ritonavir, but not many kids are getting this medicine overall.

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● EHR ■ ADULT ◆ RISK FACTORS

Insights from an N3C RECOVER EHR-based cohort study characterizing SARS-CoV-2 reinfections and Long COVID

Hadley, E; Yoo, YJ; Patel, S; et al.; N3C and RECOVER consortia, *Communications Medicine*

This RECOVER study looks at how often people get COVID-19 more than once and if they develop Long COVID afterward. The study also looks at whether a repeat COVID-19 infection, or reinfection, is worse than the first one. RECOVER researchers identified a reinfection when a person had a positive COVID-19 test at least 60 days after their first infection. They studied the health records of over 3 million patients in different ways to understand COVID-19 reinfections. By studying a large number of patients, the researchers were able to learn key details about COVID-19 reinfections. They found that about 6.9% of people got COVID-19 more than once. Most reinfections happened when the Omicron variant was spreading. Researchers found that Long COVID was more common in people who had COVID-19 for the first time compared to those who were reinfected. This finding suggests that protecting yourself from getting

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often older and at higher risk of death.

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EHR ADULT BROAD SYMPTOMS RISK FACTORS

Identification of risk factors of Long COVID and predictive modeling in the RECOVER EHR cohorts

Zang, C; Hou, Y; Schenck, EJ; et al., *Communications Medicine*

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Researchers still don't fully understand why some people get Long COVID while others do not. In this RECOVER study, researchers wanted to learn what increases someone's risk of developing Long COVID after getting COVID. Researchers studied the electronic health records of 2.1 million people from New York and Florida who either had, or had not had, a COVID infection between March 2020 and November 2021. Using this data, they created a new computational model (a computer program that imitates how something works in real life) to help identify the things that Long COVID patients had in common. The researchers looked at whether these shared factors increased their risk of developing Long COVID. The model found that the people who were more likely to develop Long COVID if they had a severe first COVID infection, were underweight, or had other health problems, like cancer or liver disease. The results also show that computational models can help identify people who have a higher chance of developing different symptoms and types of Long COVID. This information is important because it can be used to help researchers find new ways to prevent, diagnose, and treat Long COVID.

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● EHR ■ PREGNANT ADULT ◆ RISK FACTORS

Association between acquiring SARS-CoV-2 during pregnancy and post-acute sequelae of SARS-CoV-2 infection: RECOVER electronic health record cohort analysis

Bruno, AM; Zang, C; Xu, Z; et. al.RECOVER EHR CohortRECOVER Pregnancy Cohort, *eClinicalMedicine*

Little is known about Long COVID in pregnant women. This study looked at whether getting COVID while pregnant might increase the chances of

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who had a test showing that they had a COVID infection between March 2020 and February 2022, and looked at 83,915 women who were not pregnant and 5,397 who were. Women who got COVID while pregnant were less likely to get Long COVID than those who weren't pregnant. Pregnant women with COVID were more likely to develop certain conditions related to Long COVID, like an abnormal heartbeat. But they had a lower risk of getting other conditions, like malaise (feeling unwell). Overall, pregnant women with COVID had a lower chance of getting Long COVID in the 30 to 180 days after they first got sick.

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● EHR ■ ADULT ◆ BROAD SYMPTOMS ◆ VIRAL VARIANTS

Excess burden of respiratory and abdominal conditions following COVID-19 infections during the ancestral and Delta variant periods in the United States: An EHR-based cohort study from the RECOVER Program

Varma, JK; Zang, C; Carton, TW; et. al.RECOVER Consortium, *PLOS ONE*

The virus that causes COVID-19 can change over time, creating new virus types called variants. This study explored if problems related to Long COVID were different in people who were infected with different variants of COVID. Researchers looked at medical records from 2 databases in New York and Florida. They compared people who had the original type of COVID with those who had a variant called Delta, which was one of the main variants in 2021. The researchers found that some Long COVID conditions were more common in the people who had Delta. For example, some people infected with Delta developed clots in the blood vessels in their lungs. People who had Delta were also more likely to have stomach symptoms than people who were infected with the original type

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● OBSERVATIONAL ■ PEDIATRIC

Researching COVID to enhance recovery (RECOVER) pediatric study protocol: Rationale, objectives and design

Gross, RS; Thaweethai, T; Rosenzweig, EB; et. al.RECOVER-Pediatric Consortium, *PLOS ONE*

A COVID-19 infection can lead to new symptoms or symptoms that do not go away. This condition is called Long COVID. RECOVER researchers are working to answer questions about Long COVID in children. To do this, they are studying over 15,000 children and their caregivers in the US to understand how common Long COVID is in children and their caregivers; how the body changes when someone has Long COVID; what makes some people more likely to develop Long COVID, such as where a person lives and their age, race, and sex; and what happens in the body that might cause Long COVID. This paper is important because it can show other scientists how to do their own research on Long COVID in children.

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● CLINICAL TRIAL ■ ADULT

RECOVER-NEURO: Study protocol for a multi-center, multi-arm, phase 2, randomized, active comparator

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Knopman, DS; Laskowitz, DT; Koltai, DC; et al., *Trials*

The researchers and study team running the RECOVER-NEURO clinical trial published a paper detailing the study's design. RECOVER-NEURO is looking at 3 possible treatments for cognitive dysfunction, or brain fog, symptoms related to Long COVID. The possible treatments, also called study interventions, are BrainHQ (an interactive online brain training program), PASC-Cognitive Recovery (an online goal management training program), and transcranial direct current stimulation (a safe, noninvasive form of brain stimulation). The research team is using a variety of assessments, including brain function tests and participant surveys, to determine if these study interventions reduce brain fog symptoms and help people function better.

People with brain fog may have trouble thinking clearly, remembering things, or focusing on tasks, which can severely affect their daily functioning and quality of life. Results from this study will help the Long COVID community learn if BrainHQ, PASC-Cognitive Recovery, and transcranial direct current stimulation can be used to treat cognitive dysfunction symptoms related to Long COVID.

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